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ABSTRACT

A study was initiated at University College of the University of Cincinnati to test the effect of composing and revising at a computer on the writing performance of developmental English students. Students enrolled in English for Effective Communication (EEC I) were divided into three groups: a control group that did not use the computer at all; a group who had access to Apple IIe computers equipped with Bank Street Writer II word processing software; and a computer group using Bank Street and Writer's Helper, software which guides the students through the entire writing process. At the end of Winter 1989, after 7 of the 11 quarters of the study had been completed, 698 students had enrolled in EEC I. Study findings, based on students' essays, freshman English entrance examination scores, and course evaluations, included the following: (1) the control and Writer's Helper groups had the highest average scores on the first of the four major papers in EEC I, while the Bank Street Writer group had the highest percentage passing the entrance exam; (2) only 27.4% of the students had no prior computer experience; (3) while students felt that using the computer in composition courses was enjoyable, helpful, and increased their self-confidence, they were significantly less willing to grant that computer use contributed to their skill in writing; (4) the two computer groups rated both their instructors and courses more highly than did the control group; and (5) students were reluctant to use the computer for intellectual experimentation, valuing it more for its convenience. Tentative conclusions suggest that computer use may affect students' attitudes more than their writing performance. (ALB)

THE EFFECT OF CLASSROOM COMPUTER USE ON BASIC WRITERS:

A CONTROLLED STUDY IN PROCRESS

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THE EFFECT OF CLASSROOM COMPUTER USE ON COLLEGE BASIC WRITERS: A CONTROLLED STUDY IN PROGRESS

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In the past decade the composition classroom has taken on an entirely new look. Just yesterday, it seems, we rhetoricians confessed--smugly, perhaps--to a certain squeamishness in the presence of Technology. Now many of us use computers not only for our own work, but also in our classrooms. But does the word processor really help students to write better? Many scholars have attempted to answer that question. However, as is obvious from the chart in Fig.1, these studies have been far from conclusive. Hawisher (1988) states that "results from research [since 1981] were varied and conflicting." Many excellent studies have been undertaken; but in general, they involve small samples, they focus on one quarter or semester only, and they do not include a control group. The small sample factor is particularly disturbing. Travers (1964) calls deficiencies due to insufficient cases "one of the most elementary errors in experimental design."

We hope to offer a different approach. At University College of the University of Cincinnati we are in the midst of a study designed to test the effect of composing and revising at the computer on the writing performance of developmental English students. Our project team--Deb Meem, Floyd Ogburn, Janet Reed, Gary Vaughn, Rex Easley, and Mary Benedetti of the University College Language Arts

department--seeks to examine a large sample of students enrolled in English for Effective Communication (EEC) I. EEC is a developmental English course required of all students who score 3 or less (6-point scale) on the holistically graded Entrance Exam in English composition administered to all freshmen during orientation. In this course we stress both grammar and paragraph organization as we prepare students for the Entrance Exam retake at the end of the quarter. Although we are not rigidly dogmatic, in EEC we teach process writing roughly in line with the philosophies of Peter Elbow, Don Murray, Janet Emig, and other theorists. EEC students participating in the study are divided into three groups: (1) a control group who do not use computers at all; (2) a group who have access to Apple IIe computers equipped with the Bank Street Writer II word processing program; and (3) a computer group using Bank Street plus Writer's Helper, a "thinking aid" supplementary program which guides students through the entire writing process--prewriting, organizing, composing, and revising.

Background.

The EEC program in University College/UC is particularly well suited to a project of this type. EEC represents an established developmental English program in an open-admission two-year college located on the main campus of a large urban university. Our location and our mission together guarantee a fairly constant student population, including many from local inner-city high

schools. The University College is committed to excellence in teaching, and its administration looks favorably upon research in this area. In addition, the University College administration has consistently allotted generous financial backing to its developmental programs. In our case, EEC benefits from this ample support: most courses are taught by full-time faculty; classroom work is supplemented by a Drop-In Writing Lab staffed by professional tutors; basic writing courses have a mandated maximum class size of 17 students; two professional tutors are present in class twice a week to assist the instructor and allow for frequent individual consultation; and finally, the EEC faculty has had the opportunity to design and equip an Apple computer classroom.

This computer teaching laboratory is truly a customized phenomenon. We have outfitted a classroom with 17 Apple IIe computers (to match the maximum EEC class size) positioned in four rows, each row also containing one Imagewriter printer accessible to individual computers via an electronic switchbox. The printers are located in the middle of each row; there is thus a "group" of two or three computers on each side of the printer. This built-in grouping facilitates interaction among students, and allows novice computer users easy access to more experienced neighbors. The 17 computers are linked to a Corvus hard drive and data bank. All computer classes use the Bank Street Writer word processing program, network version; we are thus able to

dispense with the cumbersome process of distributing and keeping track of floppy disks for each student. We assign individual volume numbers and passwords to each student, to allow some privacy. The EEC course requires two "lab" days per week, so students automatically get a minimum of two hours at the computer. Many students arrange to come in when classes are not meeting so as to have more time with the computer; or they may use the four additional Apples located in the Writing Lab.

Software.

Bank Street Writer is an extremely user-friendly word processing program, designed for the neophyte. The writer generates text within a rectangle which occupies the bottom 5/6 or so of the screen. Above the text box are easy-to-follow directions for operating the program. There are no bells and whistles with Bank Street Writer--one PRINT-DRAFT and one PRINT-FINAL option only, for instance--but the program is easy to use, and our basic writers produce material on-screen within fifteen minutes of their first encounter with it.

Writer's Helper is a "thinking aid" program which includes eleven "Find and Organize a Subject" exercises, and eleven "Evaluate a Writing Project" exercises. In our EEC I course we use only certain parts of the "Find and Organize" menu. From "Find a Subject," our controlled study group uses Brainstorms (a free writing activity), Lists (possible subjects), and The Questioner (questions to help select a

subject). From "Explore a Subject" we use Crazy Contrasts (comparison of the student's writing topic to another, unusual subject, e.g. "List three ways your subject, MY BOYFRIEND MIKE, is like an iceberg"), Teacher's Questions (questions supplied by us and geared to a specific writing assignment), and Three Ways of Seeing (examination of the student's topic in isolation, as a process of change, and in relation to other subjects). When time permits, some of us go on to two "Organize Information" activities, Trees (grouping thoughts about a subject into categories), and Develop a Single Paragraph (a guide for writing descriptive or argumentative paragraphs). The "Evaluate a Writing Project" section of Writer's Helper involves basically CAI-type components: word counts, readability level, usage checks. Our teaching group found that this type of evaluation information required a great deal of explanation and interpretation for our EEC students, so we limit student usage of this part of the program.

Methodology.

Our goal has been to devise an experimental study to test whether developmental-level students benefit in any concrete ways from access to computers for composing, revising, and editing. With six of us teaching special "controlled study" sections of EEC I, we have an available sample (students who complete the course and receive a final grade) of approximately 200 participants per year. This is a much larger sample than any previous study has been able

to test, and represents a huge advantage for us as we seek to establish statistical credibility. At the same time, the multiple intructors/large sample factor presents certain problems. Our teaching styles and grading standards differ. How could we overcome these natural differences and assure that all EEC I students involved in the study have in fact studied the same material and had comparable educational experiences?

In setting up the controlled study we made a strong effort to control variables. Our original five-person teaching team (now expanded to six) agreed that a standardized EEC I course was a necessity. We therefore hammered out not only a common syllabus, but a common day-by-day schedule we could all follow. Although we made no effort to influence individual classroom styles, we felt confident that we would all teach a common course content. Grading posed another problem. Obviously, we could not group-grade every paper. Yet we wanted to set common standards. Our solution to this problem was to select an "anchor" student from each section to serve as a subject for norming. This was to be the "average" student, who scored 3 on the Entrance Exam and whose placement test score in reading (University College uses the Degrees of Reading Power test) was as close as possible to the average DRP score for all EEC-placed students that quarter. After each paper came due, the teaching team met and group-graded the anchor papers. This norming session allowed us to discuss

expectations and standards for each writing project. We established a point system for grading as an additional attempt at consistency; furthermore, points allow for easy data entry and averaging at quarter's end.

In the context of this standardized course, we decided to divide our EEC I sections into three groups of approximately equal size: a non-computer control group, a word processing group, and a "thinking aid" group. Our rationale for identifying three groups instead of only two was that with our large potential sample we felt we could go beyond simply focusing on word processing as a composition tool. We could test for differences in degree of computer intervention, and see if Writer's Helper's structured prewriting and organizing activities led to added skill in composition and presentation. EEC sections are assigned randomly to groups, based on instructor schedules and availability of the computer room; students do not know until the first day of class whether they will use the computer or not. In a further attempt to control variables in the study, each instructor was assigned both computer and non-computer classes, and/or Bank Street and Writer's Helper classes. In other words, we tried to arrange the teaching assignments so that no one instructor taught all one classification.

Results.

And now we take up that elusive question--did the computer users perform better than the control group? So

far the results are equivocal at best. Through the end of Winter quarter 1989, 698 students have participated in our study. Of these, 233 have been assigned to non-computer control sections, 233 to computer classes using Bank Street Writer only, and 232 to sections utilizing the Writer's Helper as a computerized teaching supplement. If we compare the results of the three groups [Selected Results by Group, Fig.2], no one division stands out as statistically superior to the others. After seven quarters the Control and Writer's Helper groups show the highest average scores on the Interview essay (the first of the four major papers in EEC I); the Bank Street Writer group has the highest percentage passing the Entrance Exam. Overall, however, what is most interesting about Fig.2 is not how the three groups differ, but how remarkably close they are. It is also interesting to notice, as we look at Fig.2, that if we had ended our study after a single quarter (F86), we would have had to conclude that using computers might actually hurt performance. This trend has evened out considerably since then, probably because the instructors have become much more proficient in exploiting the possibilities of the computer. Nevertheless, at this point we must say that access to a word processor does not lead to quantifiable improvement in our students' performance. This result jibes with recent research--Warantz & Keech (1982), for example--which indicates that longitudinal studies in writing require a minimum of sixteen months (as opposed to

our ten weeks) to show observable progress. Thus it is not surprising that we did not observe any tangible improvement in our EEC computer students.

A different trend is visible, however, in the results of the evaluation forms completed by each student during the last week of the quarter. These forms have three parts. All controlled study participants, computer and control, do Part 1, which centers around 14 questions based on the widely used Purdue Cafeteria evaluation instrument. These questions ask the student to rate the professor (for example, "My instructor has an effective style of presentation") and the course ("Assignments are interesting and stimulating"). All students in the Bank Street and Writer's Helper groups go on to Part 2, which focuses on the computer experience. Here participants rate their Apple work in terms of both enjoyment and effectiveness as a means of learning. They also indicate what, if any, prior computer experience they have had. Part 3 is reserved for the Writer's Helper group, and in this section students rate their level of satisfaction with the five components of the Writer's Helper program used in the course. Fig.3 presents the evaluation summaries for computer classes, and reveals some interesting facts. When we first began experimenting with Apple lab teaching, we wondered how computer literate or illiterate our students would be. To our surprise and pleasure, it has turned out that only 27.4% of our EEC students enter the class with no computer experience at all

(and this percentage has dropped every quarter since the study began in Fall 1986, when the figure was 30.2%); more than half have taken an Introduction to Computers course in high school. The Evaluation Results [also on Fig.3] are also revealing. In section I (BSW + WH) we see that while students value their Apple lab experience highly in the areas of Enjoyment (5.1 out of 6), Confidence-building (4.82) and Helpfulness (5.03), they are significantly less willing to grant that computer use contributes to increased skill in writing (4.14). It appears that they value word processing for its convenience rather than for its ability to promote learning. Section II focuses on various Writer's Helper activities, and it is obvious that students prefer Teacher's Questions (4.32), Brainstorms (4.5), and Lists (4.6) to the more abstract Crazy Contrasts (3.78) and Three Ways of Seeing (3.9). This indicated preference reveals another aspect of the EEC student profile; we recognize individuals who are far more comfortable with direct, immediately applicable activities, such as list-making, than with mind-stretching creative work, such as Crazy Contrasts.

So far I have painted a rather bleak picture of an ambitious experiment producing no visible results in terms of performance, nor any strong positive impressions in terms of explicitly stated student satisfaction. Yet in one significant way our EEC computer students do react positively to their Apple work. Examination of the Purdue data from Part 1 of the evaluation shows that students in

the two computer groups rate both instructor and course higher across the board than do their control group counterparts. Fig.4 focuses only on the three final and most global Purdue statements. [I should remind the reader at this point that if scores in the 3 range out of 5 seem low, EEC is a required course for students who have failed a writing exam. Many students resent their placement in EEC, and course evaluations reflect this resentment.] While the control group averaged 3.41 agreement with the statement "Assignments are interesting and stimulating," the two computer groups averaged 3.7. In other words, the computer students rated the same assignments nearly .3 higher. Small differences are also visible for Purdue 13 ("This is one of the best courses I have ever taken") and Purdue 14 ("My instructor is one of the best teachers I have had"). Same assignments, same course, same instructors--yet the computer group consistently displays a more positive perception of EEC I than the control group. I say "consistently" because although Fig.4 summarizes results for only three Purdue units, in fact the computer groups showed higher results on every one of the 14 Purdue questions.

So what can we conclude from this data? The study is still perhaps four quarters away from completion, but at this point one would have to theorize that developmental writing students perform at about the same levels objectively whether or not they have access to a computer as a classroom tool, and whether or not additional software is

available. Furthermore, they indicate a reluctance to utilize the computer as a vehicle for intellectual experimentation rather than merely as a convenience product. On the other hand, however, evaluation results indicate a positive perception of the computer; this attitude is reflected not so much in explicitly computer-directed responses, but in intangible self-image areas and in overall good reaction to the course. EEC students like to use computers, and they like the way they feel about themselves when they use computers.

Future Directions.

Our teaching team plans on continuing the controlled study in the EEC I course at least through Fall 1990, with a target total sample of 1000 students. It seems clear at this point that we are not going to observe any thrilling quantum leaps in performance level in our computer users. But the non-quantifiable affective result is equally important to us, since attitude is crucial to success for writers in general and basic writers especially. We are also exploring some "spinoff" areas, and increasing our sample size should allow us to lend numerical credence to these results as well. We have seen some trends concerning gender (of student, of professor) which warrant further investigation. We have extended the study through EEC II, the continuation course for the 38% or so of EEC I students who do not pass the Freshman English Entrance Exam. Finally, we have taken a first look at adult EEC students

enrolled in University College's Pre-Technical Training Program, who appear to pass the Entrance Exam in startlingly high numbers when placed in Writer's Helper sections of EEC I.

In short, we have much to do. We feel that the ultimate validity of our study, and others like it, depends to a large degree upon our ability to rely on a large sample population each year, and our willingness to gather data over time. Perhaps eventually we will see a relationship between computer use and enhanced performance; or perhaps we will discern no quantifiable positive result. In the latter case we will have to continue to be content with the subjective responses our students give. We may need to accept the fact that our Apples will ultimately affect attitude far more than achievement. At the basic writing level, this may be good enough.

Fig.1. SURVEY OF RESEARCH IN WORD PROCESSING

[adapted from Gail Hawisher, "Studies in Word Processing," Computers & Composition, 11/86, and "Research Update: Writing and Word Processing," C&C, 4/88]

STUDY	METHOD	WKS	SAMPLE	NUMBER
Beserra 1986	survey	x	basic writers	6
Bridwell et al., 1986	case study	x	grad students	8
Bridwell et al.,1985	survey	10	three classes	48
Catano 1985	case study	52	novelists	2
Cirello 1986	experimental	20	10th gr.basic writers	30
Collier 1982, 1983	case study	6	fem.nursing students	4
Coulter 1986	experimental	16	1st yr. coll. students	62
Daiute 1984	case study	5	9-12 yr.olds	8
Daiute 1986	experimental	36	7-9 graders	57
Duling 1985	experimental	36	9th graders	1 class
Etchison 1985	experimental	16	1st yr. coll. students	96
Gerrard 1982-83	survey	10	1st yr. coll. students	44
Gould 1981	experimental	x	IBM researchers	10
Haas 1987	exploratory	x	academics	15
Harris 1985	case study	x	college students	6
Hawisher 1987	experimental	16	1st yr. coll. students	20
Herrmann 1985	ethnographic	36	10-12 graders	8
King et al. 1984	experimental	16	female basic writers	10
Kurth 1986	exploratory	12	8-9 graders	x
Levin et al., 1985	survey	36	x	30
Lutz 1983	case study	x	prof/experienced	7
Miller 1984	experimental	4	6th graders	28
Nichols 1986	survey	7-10 da.	college basic writers	5
Pivarnik 1985	experimental	x	basic HS jrs.	76
Posey 1986	experimental	14	college basic writers	13
Rodrigues 1985	exploratory	16	college basic writers	12
Selfe 1985	survey	16	college students	51
Selfe et al., 1986	survey	x	college instructors and students	27
Sommers 1986	experimental	16	college students	79
Sommers 1986	survey	16	college students	31
Womble 1985	exploratory	52	10th graders	3

Fig. 2. SELECTED RESULTS BY GROUP

Number of Students

F86	W87	F87	W88	S88	F88	W89	Total
149	47	160	58	38	204	42	698

ASSIGNMENT	AVERAGE SCORE								SECTION
Interview (first) 15 points	11	11	11	12	11	11	11	11.0	all
	11	11	12	12	11	12	12	11.4	control
	10	11	11	12	11	11	11	10.82	BSW
	12	12	11	11	12	11	12.6	11.33	WH
Ad (last) 35 points	27	26	26	28	25	25	27	26.06	all
	27	25	27	29	25	26	27	26.6	control
	26	26	25	27	27	25	26	25.6	BSW
	27	27	26	28	25	26	28	26.5	WH
Total points for course-- 200 possible	156	157	156	160	156	155	162	156.46	all
	160	149	162	160	159	153	165	157.9	control
	152	158	155	158	162	155	160	155.5	BSW
	157	160	152	162	149	157	159	156.26	WH

Entrance exam (all quarters)	433 out of 698 pass (62%)	all
	145 out of 233 pass (62.2%)	control
	146 out of 233 pass (62.7%)	BSW
	142 out of 232 pass (61.2%)	WH

Fig. 3.

A. PRIOR COMPUTER EXPERIENCE

F86, W87, F87, W88, S88, F88, W89 (445 students)	High school course	237 (53%)
	CAI lab	225 (50.6%)
	Other UC course	114 (25.6%)
	Work experience	82 (18.4%)
	Own	81 (18%)
	No experience	122 (27.4%)

B. EVALUATION RESULTS (6-point scale)

I. BSW + WH	Enjoyment	Confidence	Helpful	More Skill
Fall 86 (86)	5.2	4.8	5.0	4.1
Winter 87 (37)	4.9	4.95	4.9	4.35
Fall 87 (108)	5.0	4.7	5.1	4.0
Winter 88 (41)	5.2	4.9	4.95	3.8
Spring 88 (24)	5.2	4.6	5.2	4.3
Fall 88 (122)	5.0	4.7	5.0	4.0
Winter 89 (27)	5.4	5.15	5.5	4.8
All (445)	5.1	4.82	5.03	4.14

II. WH	Teacher's Questions	Crazy Contrasts	3 Ways of Seeing	Brain-storms	Lists
F86 (33)	4.4	3.7	4.2	4.6	4.7
W87 (22)	4.3	3.6	3.7	4.4	4.7
F87 (54)	4.2	3.7	3.9	4.3	4.5
W88 (29)	4.7	4.1	4.3	4.7	4.7
S88 (16)	4.1	3.6	3.4	4.25	4.5
F88 (69)	4.2	3.95	4.0	4.4	4.5
W89 (7)	3.6	3.14	3.7	4.0	3.3
All (230)	4.32	3.78	3.9	4.5	4.6

Fig. 4. PURDUE EVALUATION COMPARISONS (5-point scale)
F86, W87, F87, W88, S88, F88, W89

Assignments are interesting and stimulating. [Purdue 12]

Control group average	3.41
BSW group average	3.69
WH group average	3.7
BSW + WH (all computer)	3.7

This is one of the best courses I have ever taken. [Purdue 13]

Control group average	3.2
BSW group average	3.36
WH group average	3.52
All computer	3.48

My instructor is one of the best teachers I have had. [Purdue 14]

Control group average	3.76
BSW group average	3.84
WH group average	4.02
All computer	3.96

Works Cited

Beserra, W.C. (1986). Effects of Word Processing Upon the Writing Processes of Basic Writers. (Doctoral dissertation, New Mexico State University, 1986). Dissertation Abstracts International, 48, 34-A.

Bridwell, L.S., Johnson, P. & Brehe, S. (1986). Composing and computers: Case studies of experienced writers. In A. Matsuhashi (Ed.), Writing in real time: Modelling production processes. Norwood, NJ: Ablex.

Bridwell, L.S., Sirc, G. & Brooke, R. (1985). Revising and computing: Case studies of student writers. In S. Freedman (Ed.), The acquisition of written language: Revision and response. Norwood, NJ: Ablex.

Britton, J., Burgess, T., Martin, N., McLeod, A. & Rosen, H. (1975). The Development of Writing Abilities (11-18). London: Macmillan.

Catano, J. (1985). Computer-based writing: Navigating the fluid text. College Composition and Communication 36, 309-316.

Cirello, V.J. (1986). The effect of word processing on the writing abilities of tenth grade remedial writing students. (Doctoral dissertation, New York University, 1986). Dissertation Abstracts International, 47, 2531-A.

Collier, R.M. (1982). The influence of computer-based text editors on the revision strategies of inexperienced writers. (ERIC Document Reproduction Service No. ED 266 719).

Collier, R.M. (1983). The word processor and revision strategies. College Composition and Communication 35, 149-155.

Coulter, C.A. (1986). Writing with word processors: Effects on cognitive development, revision and writing quality. (Doctoral dissertation, University of Oklahoma, 1986). Dissertation Abstracts International, 47, 2551-A.

Daiute, C. (1984). Can the computer stimulate writers' inner dialogues? In W. Wresch (Ed.), The computer in composition instruction. Urbana, IL: NCTE.

Daiute, C. (1986). Physical and cognitive factors in revising: Insights from studies with computers. Research in the Teaching of English 20, 141-159.

Duling, R.A. (1985). Word processors and student writing: A study of their impact on revision, fluency, and quality of writing. (Doctoral dissertation, Michigan State University, 1985). Dissertation Abstracts International, 46, 3535-A.

Elbow, P. (1973). Writing Without Teachers. New York: Oxford University Press.

Elbow, P. (1981). Writing With Power. New York: Oxford University Press.

Emig, J. (1983). The Web of Meaning. Montclair, NJ: Boynton/Cook.

Etchison, C. (1985). A comparative study of the quality and syntax of compositions by first year college students using hand-writing and word processing. (Doctoral dissertation, Indiana University of Pennsylvania, 1985). Dissertation Abstracts International, 47, 01-A.

Flower, L. & Hayes, J.R. (1980). A cognitive process theory of writing. College Composition and Communication 31, 365-387.

Gerrard, L. (1982). Using a computerized text editor in freshman composition. Los Angeles, CA: UCLA Writing Programs. (ERIC Document Reproduction Service No. ED 192 355).
Gould, J.D. (1981). Composing letters with computer-based text editors. Human Factors 23, 5, 593-606.
Haas, C. (1987). Computers and the writing process: A comparative protocol study. Pittsburgh, PA: Carnegie Mellon University Communications Design Center, Technical Report No.33.
Harris, J. (1985). Student writers and word processing: A preliminary evaluation. College Composition and Communication 36, 323-330.
Hawisher, G.E. (1986). Studies in word processing. Computers & Composition 4, 1, 6-31.
Hawisher, C.E. (1987). The effects of word processing on the revision strategies of college freshmen. Research in the Teaching of English 21, 145-159.
Hawisher, G.E. (1988). Research update: Writing and word processing. Computers & Composition 5, 2, 7-27.
Hawisher, G.E. & Fortune, R. (1988). Research into word processing and the basic writer. Paper presented at the Annual Meeting of the American Educational Research Association, New Orleans, LA.
Herrmann, A. (1985). Using the computer as a writing tool: Ethnography of a high school writing class. (Doctoral dissertation, Teachers College, Columbia University, 1985). Dissertation Abstracts International, 47, 776-A.
King, B., Birnbaum, J. & Wageman, J. (1984). Word processing and the basic college writer. In T. Martinez (Ed.), The written word and the word processor. Philadelphia, PA: Delaware Valley Writing Council.
Kurth, R. (1986). Using word processing to enhance revision strategies during student composing. Paper presented at the Annual Meeting of the American Educational Research Association, San Francisco, CA.
Levin, J., Riel, M., Rowe, M. & Boruta, M. (1985). Muktuk meets jacuzzi: Computer networks and elementary school writers. In S. Freedman (Ed.), The acquisition of written language: Response and Revision. Norwood, NJ: Ablex.
Lutz, J.A. (1983). A study of professional and experienced writers revising and editing at the computer and with pen and paper. (Doctoral dissertation, Rensselaer Polytechnic Institute, 1983). Dissertation Abstracts International, 44, 2755-A.
Miller, S.K. (1984). Plugging your pencil into the wall: An investigation of word processing and writing skills at the middle school level. (Doctoral dissertation, University of Oregon, 1984). Dissertation Abstracts International, 45, 3535-A.
Murray, D.M. (1972). Teach writing as a process not product. The Leaflet, November, 11-14.
Nichols, R. (1986). Word processing and basic writers. Journal of Basic Writing 5, 81-97.
Pivarnik, B. (1985). The effect of training in word processing on the writing quality of eleventh grade students. (Doctoral dissertation, University of Connecticut, 1985). Dissertation Abstracts International, 46, 1827-A.
Posey, E.J. (1986). The writer's tool: A study of microcomputer word processing to improve the writing of basic writers. (Doctoral

dissertation, New Mexico State University, 1986). Dissertation Abstracts International, 48, 39-A.
Rodrigues, D. (1985). Computers and basic writers. College Composition and Communication 36, 336-339.
Selfe, C. (1985). The electronic pen: Computers and the composing process. In J. Collins & E. Sommers (Eds.), Writing on-line: Using computers in the teaching of writing. Upper Montclair, NJ: Boynton/Cook.
Selfe, C.L. & Wahlstrom, Billie J. (1986). An emerging rhetoric of collaboration: Computers, Collaboration, and the Composing Process. Collegiate Microcomputer 4, 289-296.
Sommers, E. (1986). The effects of word processing and writing instruction on the writing processes and products of college writers. (Doctoral dissertation, State University of New York at Buffalo, 1986). Dissertation Abstracts International, 47, 2064-A.
Travers, R. (1964). An Introduction to Educational Research. New York: Macmillan.
Warantz, E. & Keech, C. (1982). Beyond holistic scoring: Rhetorical flaws that signal advance in developing writers. In Gray et al., (Eds.), Properties of writing tasks: A study of alternative procedures for holistic writing assessment. San Francisco, CA: Bay Area Writing Project. (ERIC Document Reproduction Service No. ED 230 576).
Womble, G. (1985). Revising and computing. In J. Collins & E. Sommers (Eds.), Writing on-line: Using computers in the teaching of writing. Upper Montclair, NJ: Boynton/Cook.